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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/109,261	06/30/1998	GANG BAI	042390.P5769	3347

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EXAMINER	
WARREN, MATTHEW E	
ART UNIT	**PAPER NUMBER**
2815	

DATE MAILED: 11/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/109,261	Applicant(s) BAI	
	Examin r Matthew E. Warren	Art Unit 2815	

-- The MAILING DATE of this communication appears on th cover sheet with th correspond nc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 October 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *8-10,13-17,20 and 21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *8-10,13-17,20 and 21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

This Office Action is in response to the After Final Amendment filed on October 20, 2003.

Response to Amendment

Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8-10, 14-17, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagata et al. (US 4,015,281) in view of Momose et al. (US 5,990,516) and Moon (US 5,621,681).

Nagata discloses (col. 3, line 45 – col. 4, line 67) a transistor device having a gate electrode overlying a gate dielectric formed directly on a semiconductor substrate. The dielectric (col. 4, lines 34-49) comprises a first dielectric having a first dielectric constant and a second dielectric having a second dielectric constant different from the first dielectric constant. The first and second dielectrics are scalable for a set of feature size technologies, wherein the first and second dielectric thickness are determined by

the formula as recited in claims 8 and 15 (see the expanded formula in col. 4, lines 39-44). The second dielectric (Al_2O_3) has a greater dielectric constant than the first dielectric (SiO_2) (col. 4, lines 45-49). A third dielectric (SiO_2-P_2O_5), having a third dielectric constant may also be used in the composite dielectric layer (col. 4, lines 50-56). Nagata et al. shows all of the elements of the claims except the set of feature size technologies defined by a gate length in the range of 25-150 nm. Momose et al. discloses (col. 16, 28-48 and col. 16, line 66-col. 17, line 32) a semiconductor device having double layer gate dielectric in which the feature size technology has a gate length of 150 nm (or 0.15 μm) to form a high performance semiconductor having low power consumption. Momose et al. further discloses (col. 15, lines 13-31) that the gate length can be decreased even more to improve the current drive capability. The gate in one embodiment had a length of 40 nm (0.04 μm). Momose et al. also discloses (col. 2, lines 52-58) a semiconductor device in which the gate dielectric is less than 1/3 the gate length. The thin gate dielectric improves hot carrier reliability and ultimately the operating characteristics. Nagata and Momose shows all of the elements of the claims except the first dielectric selected from the group of HfO_2, BaO, La_2O_2, Y_2O_3 and ZrO_2. Moon shows a (fig. 2) a semiconductor device comprising a first dielectric material (11a) of Y_2O_3 and a second dielectric material (12a) of PZT which has a second dielectric constant greater than the dielectric constant of the first dielectric. With this configuration, the yttrium oxide is used as a buffer dielectric and a good quality ferroelectric is formed on the substrate. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the multi-layer gate dielectric of Nagata for

a feature size technology with a desired gate length as taught by Momose to form a high performance transistor having low power consumption. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the multiplayer gate dielectric of Nagata and Momose by using Y_2O_3 and PZT as the first and second dielectric layer as taught by Moon to form a good quality ferroelectric on a substrate.

Response to Arguments

Applicant's arguments with respect to claims 8 and 15 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Warren whose telephone number is (703) 305-0760. The examiner can normally be reached on Mon-Thurs, and alternating Fri, 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

MEW
November 6, 2003

ALLAN R. WILSON
PRIMARY EXAMINER